



**National Park Service
Ozark Highlands Cluster
Fire Ecology Annual Report
Calendar Year 2009**

A. Summary

FY 2009 was a very successful year for the Ozark Highlands fire ecology program. The highlight of the year was Lead Monitor, Erin Yeoman, being awarded a Quality Step Increase for her outstanding contribution to the NPS fire programs in Missouri and Arkansas. Erin made huge contributions to every aspect of the OZAR fire program, necessitated by several of the permanent positions being vacant.

Erin's contributions helped set the stage for the Missouri fire crew setting a record for the largest number of acres they had ever burned, despite having several vacant full-time positions. Erin's ability to multi-task, her in-depth knowledge of the complete fire program, and her eagerness to help wherever needed were all factors contributing to the success of the 2009 fire season.

One of the seasonal biological science technician positions was upgraded to an Assistant Lead Fire Effects Monitor. Angela Sokolowski earned the job and the promotion. She brought a great deal of additional knowledge to the crew and is enthusiastically learning Ozark flora. Angela made a huge contribution towards customizing a MO. Dept. of Conservation Botany Training Manual for use by our crew.

Dan Drees got the privilege of replacing Dan Swanson as the fire ecologist. Drees is in his dream job and dream location. His knowledge of tall larkspur (*Delphinium exaltatum*) helped the crew find this globally-rare wildflower in a burn unit at Ozark National Scenic Riverways (OZAR). The 2,481 plants inventoried by the crew is the largest population ever discovered in a prescribed burn unit. Since tall larkspur is dependent on fire for its long term survival, the crew hopes to develop monitoring protocols to track OZAR populations. Drees and Cody Wienk wrote a Fire Success Story about the tall larkspur and got it widely distributed.

Drees and Wienk also collaborated with Dr. Alan Templeton to write a Fire Success Story on the expansion of the state-listed collared lizards at OZAR. OZAR fire staff worked closely with the MO. Dept. of Conservation and The Nature Conservancy to get 5,000 contiguous acres burned in 2009 that is in an area with some of the best remaining habitat for collared lizards in Missouri. The lizards responded by continuing to re-colonize glades that were opened up by the prescribed fires.

This year the monitoring crew consisted of three seasonal biological science techs. Everyone did an excellent job and was critical to our program's accomplishing all of our fire effects plot work.

Erin, with some help from Dan, read 12 immediate postburn plots at OZAR and 24 fuel lines in the spring. Erin and Angela read 3 immediate postburn plots at Buffalo NR (BUFF) and 1 at Hot Springs NP (HOSP).

The fire effects monitoring crew reread 32 FMH plots at Ozark NSR, Buffalo NR, Pea Ridge NMP, and Hot Springs NP. During a glade read at BUFF, crewmember Emily Baker discovered Nuttall's pleatleaf iris (*Nemastylis nuttallii*), a state-listed fire-dependent plant of conservation concern.

Due to the limited amount of out-of-state summer fires, Erin was the only crewmember who went out-of-state on a wildfire assignment. Erin deployed to Alaska in August as a Task Force Leader Trainee on the 630,000+ acre Rex Creek Complex.

Dan worked closely with Dr. Lynn Robbins who was under contract with OZAR to start an assessment of Indiana bat activity in the park during the Spring, Summer, and Fall. There is a desire to know whether prescribed fires at OZAR between April 1 and Oct. 31 would have a detrimental impact on Indiana bats. Dan provided the bat inventory crew with a place to set up their RV for most of 2009.

Table 1. Fire Effects Plot Workload 2009

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn	Immed. Post	Postburn (1-20 yrs)	Total Plots
Ozark NSR	Glade/Woodland Transition (SCSC)	FMH forest plot	0	4	4	8
Ozark NSR	Dry Mesic Woodland Oak/Hickory (QUAL)	FMH forest plot	0	3	3	6
Ozark NSR	Dry Woodland Oak/Hickory/Pine (QUVE)	FMH forest plot	0	5	5	10
Ozark NSR	Various (Brown's lines)	Fuels	24	24	0	48
Ozark NSR	Various	CBI	0	0	0	0
Buffalo NR	Glade/Woodland Transition (SCSC)	FMH Forest plot	0	0	2	2
Buffalo NR	Dry Woodland Oak/Hickory/Pine (QUVE)	FMH Forest plot	3	3	6	12
Pea Ridge NMP	Oak Hickory forest/Woodland (OAH)	FMH Forest plot	3	0	0	3
Pea Ridge NMP	Post Oak – Black Jack Oak Woodland (QUMA)	FMH Forest plot	1	0	0	1

Hot Springs NP	Dry Woodland Pine-oak (HOSP)	FMH Forest plot	0	0	3	3
Total			31	39	23	93

Table 2. Fire Ecology Staffing 2009

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Dan Drees Fire Ecologist	2/16/09	Permanent, full time	23	No	Botany, FFI, S-215, Behave Plus 5.0, I-100, FEM, Red-carded, International Fire Congress, Feral Hogs,
Erin Yeoman, Lead Monitor	1/4/09	12/20/09	25	No	Botany, S-270, M-580, UNLV Ecology, Red-carded, Task Force Leader Taskbook, Feral Hogs, Venomous snakes,
Angela Sokolowski, Asst. Lead monitor	4/13/09	12/5/09	17	Yes	Botany, S-215, S-269, S-270, I-700, I-200, Red-carded, International Fire Congress, Feral Hogs, Venomous snakes,
Emily Baker, monitor	5/11/09	9/24/09	10	No	Botany, S-290, I-700, S-133, S-211, Venomous snakes,
Kara McSpadden, monitor	5/11/09	9/24/09	10	No	Botany, I-100, I-700, S-133, S-211, S-130/190, ATV, Red-carded, Venomous snakes,
Anthony Fornes, monitor	5/25/08	9/24/09	9	No	S-130/190, I-100, I-700, S-133, S-211, S-130/190, ATV, Red-carded, Venomous snakes,

Table 3. Management Objectives and Monitoring Results 2009

Although all of the 2009 data was entered and quality checked promptly by the monitoring staff, I have not had the time yet to complete data analysis. Erin Yeoman is guiding me through much of the data transfer to Excel.

B. Fire ecologist accomplishments and areas of focus

B. 1 Ozark National Scenic Riverways (OZAR)

OZAR Tall larkspur

I am excited that we found the largest population of the globally-rare tall larkspur ever discovered in a prescribed burn unit anywhere. The 2,481 plants inventoried by the crew is also one of the largest populations anywhere. This beautiful fire-dependent wildflower validates OZAR's application of prescribed fire at the landscape scale, since tall larkspur often grows in mesic woodlands adjoining riparian areas.

At the global level, tall larkspur is the second rarest plant at OZAR. It will be important to search for additional populations in our existing burn units and our proposed burn units. There is a shortage of fire ecology data for tall larkspur. Consequently, it would be very helpful to the scientific community if we found adequate populations of tall larkspur inside of and adjoining our proposed new burn units to demonstrate its population response to fire management.

At the encouragement of Cody Wienk, I wrote a Fire Success Story about the tall larkspur and Cody did the editing and got it widely distributed.

At the request of FMO Bobby Bloodworth, I worked with our new Fire Education Specialist to produce a tall larkspur poster for the NPS Fire and Aviation Management Conference in San Antonio.

OZAR Collared Lizards

I also collaborated with Dr. Alan Templeton to write a Fire Success Story on the expansion of the state-listed Eastern-subspecies of the collared lizards at OZAR. Again, Cody did the editing and got it widely distributed.

In 2009, Dr. Templeton reported that collared lizards successfully colonized our 974-acre Mill Mountain prescribed burn unit. Mill Mt. lays at the north edge of a contiguous mosaic of prescribed burn units that total about 6,600 acres of NPS, MO. Dept. of Conservation, and Nature Conservancy lands.

Collared lizards have now colonized virtually all of the glades embedded in these 6,600 acres that are capable of supporting them. This population group is the third largest in Missouri behind the Taum Sauk Mt. group and those in southwest Missouri.

Per Dr. Templeton's request, I reviewed and submitted edits on his scientific paper, *The Transition From Fragmented to Metapopulation In The Eastern Collared Lizard In Response To Prescribed Fires*.

At the request of FMO Bobby Bloodworth, I worked with our new Fire Education Specialist to produce a collared lizard poster for the NPS Fire and Aviation Management Conference in San Antonio.

OZAR American Barberry

The globally-rarest plant at OZAR is American barberry (*Berberis canadensis*). Interestingly, it is also considered a fire-dependent woodland species. All 14 populations of American barberry west of the Mississippi River are scattered along the upper Jacks Fork. All of these populations are relegated to well-drained soils along bluff edges where they can receive adequate sunshine.

Eleven of these are barberry sites are on NPS land. I am excited to report that I discovered one of these populations on 4/11/09 while I was searching for American barberry in our Angel Ridge prescribed burn unit.

Unfortunately, I did not notice any charcoal or charring of trees or debris within this site from the March 2007 Rx burn. Char and charcoal were observed a little farther southwest on the ridge. In an ideal world we would monitor this population with regular population inventories to determine if the population is stable, declining, or increasing.

Regrettably, the remoteness of this site would make population monitoring extremely time consuming. It would be best to check the population at a time when seed vitality could be determined. The plants in this population appeared spindly and suppressed by tree competition or lack of nutrient cycling. There were no apparent threats other than shade.

OZAR Rare Plant Element Occurrence Reports

Rare Plant Element Occurrence Reports were submitted to the MO. Heritage Database for the 2009 discoveries of tall larkspur and American barberry at OZAR. I am looking forward to becoming highly proficient in the core duties of my job so that I can have time to develop fire ecology studies of tall larkspur and American barberry someday.

OZAR Indiana Bats

I worked closely with Dr. Lynn Robbins who was under contract with OZAR to start an assessment of Indiana bat activity in the park. Unfortunately, the contract was awarded before I received a copy since I had only started 9 days earlier than the final version.

The contract states, “The Fire Management Program (FMP) at OZAR recently completed an analysis of fire effects data. The results of the fire effects monitoring show that growing season burns are needed within degraded woodland and glade communities to decrease the midstory/overstory basal area and allow higher incidents of light to the ground layer. Suggested modifications to the fire management plan are to increase the burning window in the spring (after April 1st) and late summer (before October 15th) to expedite woodland/glade community restoration. The existing Fire Management Plan and associated Biological Assessment were analyzed and approved by the USFWS with a burn window of October 15 ? April 1 to protect Indiana bats, Gray bats, and Swainson’s warblers (NPS 2004). The data collected under this proposed project will allow us to evaluate the potential impacts a change to the approved burn window would have on Indiana bats, as well as build the baseline of bat use within OZAR.”

Unfortunately, the contract only required netting between May 15 and August 15. The OZAR fire program was most in need of having Indiana bat data from the Spring and Fall time periods, which the contract did not require. We especially need the flexibility to conduct prescribed fires at OZAR during the entire month of April and the period after August 15th.

Fortunately, when I conveyed these concerns to the contract administrator, and Dr. Robbins, they both agreed that there was a need for a broader bat-netting period. Unfortunately, it was too late to amend the contract. Consequently, Dr. Robbins and his students are providing the additional netting periods out of their desire to provide us with the data we are most in need of.

I contacted several researchers working on Indiana bats and I reviewed the latest literature in order to broaden my understanding of Indiana bats relative to our prescribed fire program. I also contacted staff at Great Smoky Mountains NP, Buffalo NR, and Mammoth Cave NP to see how they were dealing with Indiana bats relative to their much more permissive prescribed burn programs.

At this time, the legitimate ecological constraints necessitated by having Indiana bats at OZAR do not appear to be incompatible with a much broader prescribed burn season.

OZAR White-tailed deer concerns



22 saplings stripped of bark by deer overpopulation in the Big Spring refuge area of OZAR.

As evidenced by the photo above, (or a typical drive along Peavine Road), there is an obvious deer overpopulation problem in the vast no-hunting area around Big Spring. I am concerned first about the negative effects this is having on the natural integrity and biodiversity of this area. Secondly, I am concerned that overpopulated deer may be distorting the fire effects data that we are collecting from our prescribed burn units in this area.

I am concerned that deer may be suppressing our attempts to restore ground flora diversity and abundance. I am also concerned that some of the tree mortality that we are attributing to our prescribed fires is actually due to bark stripping by deer.

I was also concerned that the PMIS 120517 grant request stated in various places that, “Vegetation monitoring will be conducted with the help of OZAR Fire Effects Management staff and/or staff with knowledgeable skills in vegetation identification and sampling”, “The OZAR Terrestrial Ecologist and OZAR Fire Effects Management staff will jointly develop the final protocol for collection of vegetation and deer abundance data by February 201”, and “The use of

OZAR Fire Effects Monitoring Program to assist in the establishment of vegetative sampling sites and conducting field work will cost substantially less than use of permanent or seasonal NPS employees to accomplish these same tasks”.

Consequently, I provided the following comments to Resource Management at OZAR regarding the PMIS 120517 grant request to continue additional studies of this deer overpopulation issue.

These comments were made on an e-mail sent 7/9/2009.

“Congratulations on getting the grant to conduct deer studies in the Big Spring area and taking the time to discuss parts of the proposal with me. Obviously you wrote a superb proposal to receive such a highly competitive grant.

Thank you for taking the lead on the important issue of deer overpopulation in the Big Spring area! I know that you have the ecological skills to do a superb assessment of this issue. However, I am greatly concerned that you will not be provided with enough staff and budget to study the deer overpopulation issue at the level proposed. In my experience, one \$18,000 grant is a tiny fraction of what the full proposal would cost.

I see the deer overpopulation problem at Big Spring as a political problem requiring an administrative solution, especially since most of the park is already open to hunting. In my mind it is not a scientific problem. Does the tract file give us the ease and flexibility to change the refuge boundary without major issues? The fact that the Missouri Natural Areas Committee recommended that we solve this problem back in 1998 suggests to me that we should reduce the deer herd and use the deer study to document the vegetative recovery. In my opinion we do not need the deer study to justify deer herd reduction.

As you know, the fundamentals of wildlife management tell us that without native Americans, red wolves, and mountain lions as deer predators, then deer in a large refuge will overpopulate causing significant resource damage. I believe that the photos that we have of trees girdled and killed by ravenous deer are proof that we have an immediate problem in need of an immediate solution. Current research increasingly implicates deer overpopulation with substantial degradation of ecosystems, see attached 2009 Natural Areas Journal article.

I would like to go on record as urging our administration to take action as soon as possible to reduce the deer herd in the Big Spring area. It seems plausible that the vast Big Spring no-hunting zone could be greatly reduced in size and still provide no-hunting buffer zones around park buildings, picnic areas, etc. I do not understand the tradition of maintaining a no-hunting zone that was established by the fledgling Missouri State Park system back in the 1930's when local deer numbers were at their all time low.

I believe those of us that are fighting to save natural integrity need to stay focused on species of conservation concern, and critical issues like White-nose syndrome in bats. We already have the authority and the knowledge to deal with deer overpopulation problems.

Nevertheless, I realize that the deer studies are something that you inherited with this job. Thus you are striving to do them as superbly as you performed the duties of your last job. We all need

to work together to see that this blatant deer overpopulation problem is addressed as quickly and effectively as possible. Therefore, I am eager to work cooperatively with you and others to facilitate a solution and monitor our effectiveness.

Attached is a detailed discussion of what I believe is achievable within the staffing and budget limitations of the Fire Effects Monitoring Crew”.

These comments were made on the PMIS grant request attached to an e-mail sent

“I humbly and respectfully request that my following insights be considered. These insights were gained from conducting and trouble-shooting deer census and herbivory research in Missouri State Parks for 9 years. I oversaw the project statewide for the last 4 years of those 9. We did not anticipate most of these issues when State Parks began planning for exclosures, veg. monitoring, etc. They are insights that were learned the hard way. State Parks are still doing annual deer studies because they were established as wildlife refuges in their enabling legislation and are an easy target of a PETA lawsuit. State Parks would prefer to spend their time and budgets helping species of conservation concern.

.....recommendations on deer exclosure design.....

Twenty exclosures will make the statisticians happy but that is far more than anything the Fire Effects Monitoring (FEM) crew has time to inventory. In a typical growing season the FEM crew has extremely few days when they are not already committed to FMH plot inventories in MO. and AR. Some years there are no uncommitted field days. The few uncommitted days are typically used for training, data entry, data checking, etc.

Although the inventory protocol sounds very good, Erin and I estimate it would take a FEM crew of 4 people 1 day to inventory each exclosure and its adjacent control area. In most years we probably would only have 1 day to deploy a 4 person FEM crew to exclosure inventories. Species level veg monitoring of non-blooming plants is an extremely difficult and specialized skill. Our seasonal botanists require extensive additional training and constant practice, even after attending the 40-hour customized botany training that we get from the Thomas’. I do not see any way of accomplishing the very noble and valid veg monitoring protocols with a 1-year grant of \$18,000. However, I would encourage you to discuss contract veg monitoring with the Thomas’.

Even if the Thomas’ were hired to collect the veg data someone still has to enter all of the data into a database, error check it, and do the analysis. Does NPS already have a database designed to manage this data, who provides the IT support for it, and who has the training and the time to use it?

Erin and I feel that we could commit to doing 20-minute walk-through species inventories of up to 5 exclosures and 5 control areas each year. This would only be a crude assessment of species richness but it would be something.

Another possibility is the existing FFI database. We already have FMH plots inside and outside of the Big Spring refuge. In theory, I could compare this data and determine if we have enough resolution to see the effects of deer overpopulation herbivory versus balanced deer population herbivory. Unfortunately, I am still a long way from having that level of skill in the FFI database.

Regardless of other veg monitoring options, I believe you will get the most bang for the buck by taking pictures of the exclosures and their paired control areas. Deer herbivory studies can be like rocket science, but if we are already empowered to change the refuge boundary then this one does not need to be. I believe that staff could do an adequate assessment of plant community recovery just with pictures. It will be dramatic.

I recommend that we reduce the Big Spring deer herd before the end of 2010. There is no doubt deer overpopulation continues to cause resource degradation.”

Given that the grant was awarded, but I have not heard anything about the participation of the OZAR Fire Effects Monitoring Crew, I assume that the project no longer envisions our participation. I have also not heard anything about whether deer population controls of any kind will be implement in the Big Spring no-hunting area.

OZAR Virginia sneezeweed

Virginia sneezeweed is a federally-listed threatened wildflower that inhabits marsh-like sinkhole ponds near the OZAR boundary. Bill Summers has found more populations of Virginia sneezeweed than anyone. According to personal communication from Bill Summers, Virginia sneezeweed inhabits sinkhole ponds where the high fire frequency and high fire intensity historically kept woody plants from displacing Virginia sneezeweed.

After consulting with DNR soil scientist Dennis Meinert, (who led the OZAR soil mapping project), I checked the handful of sinkholes at OZAR that might have suitable Virginia sneezeweed habitat. Although I have seen Virginia sneezeweed in Missouri multiple times, and I visited these NPS sinkholes during what should have been the peak of Virginia sneezeweed blooming, none were found.

Rainfall in both 2008 and 2009 were significantly above average. This benefits Virginia sneezeweed, making 2009 an excellent year to search for new populations.

Consequently, I feel fairly confident in asserting that no viable populations of Virginia sneezeweed exist at OZAR at this time. It is possible that Virginia sneezeweed still exists in the seedbank of some OZAR sinkhole ponds. However, it is unlikely that the historic disturbances that benefitted this plant can be adequately mimicked to germinate any dormant seedbank that may still exist.

OZAR Invasive exotics

I was informed by a member of the Missouri Natural Areas Committee that there was a formidable outbreak of Japanese stiltgrass in the vicinity of the Big Spring dining lodge and cabins. Since this is a designated prescribed burn unit my crew and I worked with the OZAR Terrestrial Ecologist to scout the vicinity.

We found sizeable scattered stiltgrass populations as far north as the Big Spring Campground and as far south as the Chubb Hollow picnic area. The stiltgrass appears to have been spread

by mowing equipment. This invasive shade-tolerant grass is of grave concern because it can spread aggressively into adjoining high natural integrity mesic woodlands or forest. In other states it has established dense monocultures covering vast areas.

According to the Fire Effects Information System, “As of this writing (2005) there is little published information on Japanese stiltgrass's fire adaptations or responses.” However, some anecdotal reports imply that stiltgrass spreads more aggressively after fire in mesic forests.

Members of the fire ecology program found and reported other populations of stiltgrass that were widely scattered through the park, including some of the most remote areas. It appears that floods and ATV's are a prime method of dispersal.

Fire crewmembers also discovered and reported several other invasive exotic plant populations to the OZAR Terrestrial Ecologist. None of these other invasive exotics appears to be as great of a concern regarding fire management at OZAR.

It is imperative that the fire ecology program keeps the OZAR Terrestrial Ecologist informed of invasive exotic discoveries since the bulk of the botanical expertise at OZAR resides in the fire ecology program. The OZAR Terrestrial Ecologist has the extremely challenging job of trying to track, prioritize, and initiate treatment strategies.

The OZAR Terrestrial Ecologist wisely and proactively organized a feral hog workshop at OZAR. The Fire Ecology/Effects staff attended this valuable training since we may be able to identify and report evidence of feral hogs before the problem is entrenched. There is good cooperation between Resource Management and Fire at OZAR to the benefit of park resources, management, and tax-dollar accountability.

2. Buffalo National River (BUFF)

I had a meeting on 8/3/09 at BUFF with Fen Wimberly, Tony Collins, and Mark Baron to discuss the fire ecology needs of the Buffalo National River. After several days of plot reads at BUFF, I submitted a detailed follow-up report and maps that discussed the following observations from myself or the crew.

2009 BUFF August 3-7 Plot Reads

Thank you gentlemen for the engaging meeting and excellent humor. Our visit to the Buffalo was delightful. We have a number of observations to share with you regarding the Pruitt Glades Burn Unit, please see attached map. Plot 10 had 3 seed-bearing plants of the fire-dependent Nuttall's pleatleaf iris (*Nemastylis nuttallii*). According to the NatureServe website this plant is imperilled in AR. It is primarily restricted to the Ozark Plateau, see attachment.

Theo Witsell said that he found this native iris growing in the burn unit close to the north side of the river road in rocky glade habitat. I assume he collected it as a Newton County record. In my anecdotal experience in Missouri, *Nemastylis* blooms more the first year following fire. It is one of the more conservative species. On a scale of 0 - 10, it has a coefficient of conservatism ranking of 9 in Missouri. Emily found it in the sunniest part of plot 10. Although it is an indicator that we are doing the right thing by burning these glades, it may need hotter fires to maintain its populations.

We saw substantial evidence at Pruitt plot 9 of young cedar trees that survived the last couple of fires completely unscathed, even though they were growing up through dense tufts of warm season grasses. It was also obvious from the water stains on the glade rock-outcroppings that these glades are prone to substantial seepage during the spring, after winter moisture recharges the groundwater. We have also seen this phenomena in Missouri, where the leaf litter in the surrounding woodlands often burns better than the glade fuels during early spring. Burning in late summer or fall, (before the groundwater recharges these ledgerock seepy glades), may be the best way to accelerate their restoration.

At Pruitt plot 8 we saw that someone had intentionally cut some of the big cedars in the plot with tree tags. Hooray! Personally I prefer to see fire-dependent natural communities restored with all the tools of our trade, although this does complicate data analysis. Dan Swanson assured me that I will be able to make the necessary adjustments to our data analysis. This plot also had a significant number of cedars that were partially uprooted by the last ice storm, apparently sometime after the chainsaw cedar felling, see attached photo. These leaning trees would be good to finish off if anyone goes back to Pruitt to cut cedars. They are currently producing considerable shade.

Unfortunately, we also found the extremely invasive Japanese stiltgrass along the North River Road in a few places and at the river access picnic area. We found no evidence of these populations spreading aggressively into the surrounding natural habitat, yet. It is only a matter of time before they become dominant monocultures. It will never be easier to eradicate these populations than it is right now. Fenn, I am not sure who this information needs to get to.

Plot 15 at Turney was notable because the crew found Ozark Chinkapin (*Castanea pumila* var. *ozarkensis*). There were 3 resprouts > 1 meter and 3 resprouts > 2 meters all coming from the same root system. When the preburn data was collected on 8/16/06 no Ozark chinkapin were noted in the plot, (nor were there any of the similar-looking Chinkapin oak recorded).

The Fire Effects Information System website says that, "chinkapin forms extensive clones where it has been burned over annually or at short intervals...Fire benefits chinkapin by removing or reducing shade-tolerant competitors and opening the overstory <http://www.fs.fed.us/database/feis/plants/tree/caspum/references.html> - 10... It is favored by disturbance at frequent but not necessarily regular intervals... chinkapin stems under 1 inch diameter are top-killed by most fires."

Fenn, is there anyone at BUFF tracking Ozark chinkapin or conducting studies?

We saw nothing unusual at the two Reddell burn unit plots except the incredibly dense ground cover of poison ivy at plot 10.

3. Hot Springs National Park (HOSP)

I had a meeting on 9/15/09 at HOSP with Josie Fernandez, Steve Rudd, Walt Abbott, Tony Collins, Fenn Wimberly, and Mardi Arce to discuss the fire ecology needs of HOSP. Josie said she did not want to skip another fire season without a HOSP Rx burn. Fenn delivered a HOSP prescribed burn within 2 months. I sent all of these people the following trip report.

My great appreciation to all of you for the warm welcome that I received to your beautiful park and city. I especially appreciated Steve taking me on a drive-by tour of the park's burn units, Josie saying that she did not want to skip another fire season without a HOSP Rx burn. and Fenn saying that he hoped to get North Mt. burned this Oct. or November.

I got to assist the crew with 3 plot reads in the Crabtree Rx Burn Unit. Plot 7 was memorable because of the angry stinging yellow-jackets. I visited part of the proposed prescribed burn unit that lies west of Cedar Glades Road on Sugarloaf Mountain (ridge) and I walked through the North Mt. burn unit.

I was impressed by the diversity of the woodland indicator herbaceous plants that were still hanging on, such as the Southern blazingstar (*Liatris squarrosa*). The steepness of much of the park was also impressive. As everyone knows, when we burn under the old-growth we will have to take special precautions to avoid strong up-hill fire runs.

Steve's tour emphasized the challenges the park is facing with a formidable array of invasive exotic species. He proudly showed me the area where Walter's crew fought very hard to eradicate a bad outbreak of kudzu. Steve was very complimentary of the superb assistance that he gets from Roads & Trails, Maintenance, and other staff at HOSP. He pointed out that in many parks that level of cooperation is rare. I commend all of you for taking a holistic approach and working together for the betterment of all park resources.

Regrettably, the fire effects crew and I found invasive exotic species were widespread, but not usually overwhelming in numbers at the places we were at. We also found Japanese stiltgrass (*Microstegium vimineum*), an invasive exotic that was not listed in Theo Witsell's report. This is a very nasty invasive capable of over-running undisturbed forest. We found it along the east fireline of Crabtree burn unit, close to Black Snake Road. This annual grass is very shade tolerant. Its seeds are easily spread by mowers, ATV's, horses, people, and floods. It has recently turned up in many of the most remote areas at OZAR. Frankly, it is probably already widespread at HOSP and there is probably little that can be done. See <http://www.nps.gov/plants/alien/> for more info.

Given that invasive species populations will probably always exceed our eradication capacities, I think you all are doing the right thing by focusing on the worst offenders. I would put kudzu at the top of the list. Tree-of-Heaven and Princess Tree also have the ability to displace native canopy trees and dominate the overstory. Steve and I discussed that both of these trees are starting to establish in the North Mt. burn unit. Hopefully these will be a high priority for eradication while the population is still minimal. Fire will top-kill these invasive trees but they resprout with incredible vigor.

Fire in the Crabtree burn unit appeared somewhat successful in reducing the competitiveness of mimosa and privet. In the short term, HOSP will probably be lucky to stop the worst invasive plants from contaminating our areas of high natural integrity, high cultural significance, and high visibility. Sorry that I can't be more optimistic. Thirty years of fighting invasive exotics has taught me to be a pragmatic prioritizer.

4. Pea Ridge National Military Park (PERI)

On 8/31/09 the fire effects crew and I encountered an infestation of several hundred plants of Japanese stilt grass along the Big Mountain horse trail while we were hiking to OAH plot 4.

I had a meeting on 9/1/09 at PERI with John Scott, Kevin Eads, Tony Collins, Nolan Moore, and Matt Fry to discuss fire management objectives and options, deer overpopulation impacts on fire effects results, invasive exotic issues, etc. Tony Collins and I conducted site evaluations to assess fire options.

Regrettably, I did not find time to write a trip report about my observations. However, I did make personal time to read the Shea and Hess book on the Battle of Pea Ridge that hopefully will enlighten me on the opportunities to assist PERI staff in their management objectives.

Table 4. Fire Ecologist Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	15%	• Determined fire effects travel costs to area parks. Writing supplemental budget requests. • Submitted a detailed response to the OZAR deer overpopulation PMIS 120517 grant. • Developed the draft plot read schedule for OZAR, BUFF, HOSP, and PERI. • Developed a supplemental budget request for a total of 8 seasonal-FEMO pay periods. • Initiated planning as coordinator for the Prescribed Fire Workshop at the 2010 National Natural Areas Conference. • Initiated planning as the lead instructor for the RX-310 class at the Midwest Fire Academy. • Wrote a PMIS Youth Intern Program grant request to conduct supplement studies of tall larkspur at OZAR.
Presentations	5%	• Presented the Essential Role of Fire for the MO. State Park Legacy Training Committee for their advanced administrators. • Lead an 8-person Ozark ecology class and 4 NPS interper staff on an all-day tour of Rx burn units in the Rocky Creek area. • When our Fire Education Specialist position was vacant, I worked with Cody Wienk to write and distribute 2 Fire Success Stories. • After our Fire Education Specialist position was filled, I worked with Dena to produce 2 posters for the NPS Fire and Aviation Management Conference.
NPS Meetings/ task groups	10%	• Park meetings, Indiana bat research meetings, GMP meetings, OZAR safety committee member meetings. • Met with the fire and resource staffs of BUFF, PERI, and HOSP to get acquainted and learn what their fire ecology needs are.
Interagency work	4%	• Helped coordinate both established and future interagency burn units with the MO. Dept. of Conservation, The Nature Conservancy, and Pioneer Forest.
Fire Assignments	1%	• FFT2 on 1 WF(1 operational period)
Research	10%	• Conducted literature reviews and tracked down knowledgeable experts on the ecology of tall larkspur, American barberry, and Indiana bats. • Provided edits to Dr. Templeton's scientific paper on collared lizards at OZAR.
Data collection	15%	• Brown's lines, FMH plots, and rare plant searches in Rx burn units.
Data entry	0%	• Monitors completed data entry.
Data management & analysis	10%	• Ozark Highlands area parks fire effects data analysis
Supervision/Admin	15%	• Hiring, supervision, performance appraisals & PA plans for 5 staff. • QSI award nomination for Erin Yeoman. • Recruited aggressively for seasonal botanists with numerous job board postings on botany, fire, and natural resource websites. • Botany training MOU, travel, payroll, etc.
Training	10%	Attended Botany Training, FFI, S-215, Behave Plus 5.0, ICS-100, FEM, Red-carded, International Fire Congress, Feral Hog Workshop, several

		DOI-Learn classes, Fed. Personnel Payroll System, Quicktime, PMIS, hands-on FFI, FMH, and other training from Erin and Angela.
Miscellaneous	5%	- Submitted detailed weekly reports to FMO. - Functioned as the map maker for the OZAR Fire Shop. - Fire monitoring trip reports were submitted to BUFF, PERI, and HOSP.

C. Fire effects crew accomplishments and areas of focus

This section deals with roles and functions of the fire effects crew. Identify accomplishments and/or focus areas along with a rough estimate of the amount of time spent in these areas (see table format and example below).

Table 5. Fire Effects Crew Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	35	Estimated amount of time spent collecting plot data; includes any preparation time.
WUI plots	0	
CBI plots	0	
Other plot work	5	Identify type of plot – WFU, exotic plants, etc.
Fire Assignments	5	Identify types of assignments; include READ (Resource Advisor) activities
Fuels Project work	5	Fuels project work
Data entry	15	Estimated amount of time spent entering data from paper to PC
Data analysis	5	This is expected to be very low number or zero for fire effects crew/lead monitor
Supervision/Admin	15	Travel, payroll, etc.
Training	10	List all training courses attended including in-park, NPS/interagency, and non-government
Miscellaneous	5	Things that don't fit in other categories – search and rescue, assisting other work groups, etc.

D. Complete Annual Report Supplement (“2009 Annual Report Supplement.xls”)

E. Annual Report Supplement Additional Information

Be sure to **complete numbers 1 and 2 below**. Number 3 is optional.

1. Identify types of fire effects monitoring databases or spreadsheets being used (e.g., FFI, Access, Excel).
FFI, Access, Excel
2. Annual Meetings - Provide a brief description of the 2009 meeting(s) where fire ecologists present and discuss monitoring results with fire and non-fire park staff, and others have informal discussions.
 - Had a meeting on 8/3/09 at BUFF with Fen Wimberly, Tony Collins, and Mark Baron to discuss the fire ecology needs of the Buffalo National River. After several days of plot reads at BUFF, I submitted them a detailed follow-up report that discussed observations of a rare plant (*Nemastylis nutallii*) in a plot, several invasive exotic species issues, mechanical thinning of tagged FMH plot trees, and trees downed by ice.
 - Had a meeting on 9/1/09 at PERI with John Scott, Kevin Eads, Tony Collins, Nolan Moore, and Matt Fry to discuss fire management objectives and options, deer overpopulation impacts on fire effects results, invasive exotic issues, etc. Conducted site evaluations with Tony Collins to assess fire options.
 - Had a meeting on 9/15/09 at HOSP with Josie Fernandez, Steve Rudd, Walt Abbott, Tony Collins, Fenn Wimberly, and Mardi Arce to discuss the fire ecology needs of HOSP. Josie said she did not want to skip another fire season without a HOSP Rx burn. Fenn delivered a HOSP prescribed burn within 2 months. I sent all of these people a trip report that included observations and locations of some aggressive invasive exotic species that we saw during our plot reads.
3. If further explanation for the Annual Report Supplement information is needed, please provide it here as well as any other information relating to the spreadsheet that you would like to include.